REMARKS

Favorable reconsideration and allowance of the claims of the present application are respectfully requested.

In the present Office Action, which has been made FINAL, the Examiner finally rejected Claims 1-15 under 35 U.S.C. §103(a), as being unpatentable over Endo (U.S. Patent No. 5,852,430) (hereinafter "Endo") in view of Sato (U.S. Patent No. 5,956,006) (hereinafter "Sato").

With respect to the Examiner's reasons given in support of the final rejection of independent Claims 1, 5, 8 and 12 as being unpatentable over the combination of Endo taken in view of Sato, applicants respectfully traverse with clarifying amendments to each of these claims.

As argued in applicants previous response submitted May 12, 2003, the present invention is generally directed to setting a color temperature of a white point, e.g., at a highest gray level, in an LCD display device, and making an adjustment so as to maintain a color temperature substantially constant at each gray level. Particularly, the present invention is directed to a white point adjustment methodology and apparatus for adjusting white color coordinates at any gray level of white precisely on the CIE (chromaticity diagram).

However, in the final rejection, the Examiner indicates on page 7, first paragraph of the Final Rejection, that there exists no claim limitation directed to color temperature adjustment as argued by the applicants. In this regard, applicant takes this opportunity to clarify independent Claims 1, 8 and 12 to set forth a step of setting a color temperature of a white point. Respectfully, in view of the Examiner's rejection of the claims on the basis of

Endo, the Examiner seems to have misunderstood the term 'color temperature'. In color technology, 'color temperature' is defined as the measurement of the color of light radiated by an object (a black body) while it is being heated. (This measurement is typically expressed in terms of absolute scale, or degrees Kelvin, with lower Kelvin temperatures such as 2400° K being are red; higher temperatures such as 9300° K are blue and a neutral temperature being white, at 6504° K). Thus 'color temperature' specifies white point coordinates on CIE color coordinate (See Figure 8 of the current specification). Being a commonly known term in the area of color technology, 'color temperature' does not indicate 'Thermal', but 'color coordinates of white' (= 'white point'). Color temperature adjustment is thus equal to 'white point adjustment' (adjustment of color coordinates of white). In the cited reference, Endo merely describes an adjustment of color based on actual temperature of the LCD (ambient temperature, thermal matter), and particularly discusses the color shift of LCD in various ambient temperature (temperature of LCD itself), which is a thermal shift. Contrary to the Examiner's rejection, Figures 5 - 7 in Endo is completely different from color temperature setting as claimed in amended Claims 1, 8 and 12 of the present invention.

Further, in the final rejection, the Examiner indicated that applicants' arguments directed to adjusting white color coordinate (=setting white point) by changing a combination ratio of R/G/B sub-pixel light intensity (i.e. luminance) at a higher bit accuracy (10 bits versus 8 bits of input video) is not claimed.

Respectfully, the items which Examiner indicates are not claimed are described in the claims as follows: Claims 1 - 4, 8, 11, 12, 14 etc. indicate that input video signal comprises a plurality of color signals (e.g., Claim 1) and specifically, comprising R/G/B sub

color signals (e.g., Claims 2 and 12). Claim 1 further sets forth the first step of setting a color temperature of a white point by deciding an offset quantity of at least one color signal from a highest gray level for each color temperature. Specifically, as described in the specification, one pixel consists of three (3) sub-pixels of R/G/B. In the setting of an offset quantity in a second step of Claim 1, Claim 4 further sets forth the offset quantity set is calculated with accuracy of bits larger in number than bits of input video signal. Further, as set forth in Claim 11 (dependent upon claim 8), the white point adjusting apparatus includes a second reference table that transforms gray level coordinates arrayed at equal intervals in r(gamma)-curve of the color signal into gray level coordinates at unequal intervals corresponding to a desired luminance.

Additionally claimed in Claim 12 is a driver for driving a liquid crystal cell on the basis of adjusted R,G,and B color signals, and executing a contrast adjustment for the liquid crystal cell according to a user setting. In Claim 12, setting means provided in a stage before the driver to set white point of particular gray level according to a hue of specified white color and adjusting means provided independently of the driver to make an adjustment in order to substantially maintain the hue of white color set by setting means for gray scales other than the particular gray level. These elements signify adjustment of each color (R/G/B) and gray scale adjustment of white.

Respectfully, the foregoing respectfully support applicants' statement submitted in the applicants' prior response, that, according to the invention, a color temperature adjustment of white point is achieved by changing the combination ratio of R/G/B sub-pixel light intensity (luminance) of 8 bits with higher bit accuracy (e.g., 10 bits), resulting in adjusted gamma characteristics of R/G/B and therefore in smooth gray scale with large

number of bits. The adjustment to an accuracy of 10 bits, for example, makes very smooth gamma curve in even the basic color of red/green/blue in addition to white. This dictates the adjustment of color temperature because color temperature is equal to white point (color coordinates of white) by changing at least one color signal (this means the change of combination ratio of RGB colors). This, it is respectfully submitted, is a significantly distinguished effect from the Endo and Sato references.

As previously argued, Endo's patent is applied onto 'birefringence' type LC which realizes color display by applying an appropriate voltage to LC so that LC can transmit only a certain wave length light to display a certain color. Consequently, Endo's display system does not have sub-pixels with color filter such as Red/Green/Blue. As described in Endo, color will change from white to red, blue on color locus of birefringence type LC, and then green with increasing applied voltage. Thus, in Endo, color is not changed with the combination of sub-pixels of R/G/B. The point of Endo is that color, for example white applied at certain voltage, will change with ambient temperature, e.g., from white to red, due to characteristics of birefringence type LC. To avoid such a deviation of color, Endo settles a threshold ambient temperature (by use of ambient temperature sensors (circuit 35 of Figure 4 of Endo). As mentioned, it is a key difference that Endo is concerned with color changes due to ambient temperature, and NOT a color temperature adjustment as in the present invention. In Endo, below a threshold ambient temperature, a predefined voltage will be applied to LC to display a certain color accordingly. However, above the threshold temperature a displayed color is converged to two colors (white of minimum voltage, green of maximum volt.) by transforming mid. voltages for other colors to maximum voltage to avoid degraded/undesired color due to higher temperature. Then, only white and green are

displayed on screen. The Examiner's reference to Endo at Col. 9, lines 6-13 respectfully is misplaced as this passage does not refer to gray-scale level color, but rather the number of discrete voltage levels that may be applied to a ECB LCD pixel to be adjusted according to the ambient temperature.

Thus, Endo is entirely different from the present invention as claimed in Claims 1, 5, 8 and 12. Endo simply cannot achieve such an effect in any color as in the present invention. That is, the methodology of the invention for adjusting a color temperature of a white point achieves precise adjustment, free adjustment of white coordinates at any gray level and also keeps smooth gray scale such as black to pure green, black to pure red, black to pure blue for each sub-pixel. This results in keeping stable white color coordinates at any gray level for useful application.

Respectfully, as previously argued, Sato, like Endo, is additionally an ECB (electrically controlled birefringence) type LC. There are no sub-pixels of R/G/B on the LCD either, i.e., a certain voltage is applied onto a pixel of LC to realize a certain color. The novelty of Sato is that color data from a PC system, for example, which consists of an R, G, B combination is converted to one voltage level to enable one pixel of the LCD to display a desired color. The desired color will be approximated by the color of the nearest color coordinates on CIE, which cannot be completely the same color though. Thus, the methodology described in Sato cannot achieve the graduation of a color, for example, black to white with smooth gray scale, black to green with smooth green gray scale, etc. as in the present invention. Sato, thus does not affect the present invention whether taken alone or in combination with Endo because this methodology cannot adjust white coordinates freely,

much less precisely. That is, Sato cannot move the color coordinates of white out of color locus of birefringence type LC on CIE.

Based on the above amendments and remarks, the rejections of all claims under 35 U.S.C. §103 have been obviated; therefore the Examiner is respectfully requested to withdraw the rejection of independent Claims 1, 5, 8 and 12 and all remaining claims dependent either directly or indirectly thereupon.

In view of the foregoing remarks herein, it is respectfully submitted that this application is in condition for allowance. Accordingly, it is respectfully requested that this application be allowed and a Notice of Allowance be issued. If the Examiner believes that a telephone conference with the Applicants' attorneys would be advantageous to the disposition of this case, the Examiner is requested to telephone the undersigned, Applicants' attorney, at the following telephone number: (516) 742-4343.

Respectfully submitted,

Steven Fischman
Registration No. 34,594
Attorney for Applicants

Scully, Scott, Murphy & Presser
400 Garden City Plaza
Garden City, New York 11530
(516) 742-4343

SF:jy